

real increase; the Giladeri nulla has cut into the alluvium and flows at its very base, and, instead of the usual gradation of fall from terrace to terrace, the whole thickness is seen at once and amounts to some 40 feet. The high level of the Bisnáth Plain is seen from here to extend on the north and north-west by the tea-gardens of Diplonga and Dikro, and an isolated high patch of alluvium occurs about 4 miles west of Sútia, gradually falling by steps at long intervals into the present level of the land on both banks of the Barowli. A series of accurate levels taken over this country would be most interesting, but that it is of the same age as the clay plateau at Tezpúr and many other places in the Assam valley as far down as Gwálpára is certain. It could only have been formed under very peculiar conditions,—in still water, with the surface higher than it now is towards the delta, and with a far larger water supply from the mountains; gradual subsidence in the direction of the delta to the extent of a few feet and change of climate would soon model such outliers of an alluvium probably coeval with the extension of the Himalayan glaciers, the fine mud and sand from which would form just such clays and sands as the plateaus are composed of.



VIII.—*Note on the molluscan Genera Cœlostele, Benson and Francesia, Paladilhe, and on some species of Land-shells from Aden.*—By W. T. BLANFORD, F. R. S., F. G. S.

(Received June 24th;—Read July 7th, 1875.)

In the 'Annali del Museo Civico di Storia naturale di Genova' for 1872, Vol. III, p. 5, is a description by Dr. A. Paladilhe of *Francesia*, a supposed new genus of Asiatic mollusks. As the typical form of the genus was found in India by Benson, a short notice of this paper may be useful to Indian naturalists, the more so as there is, I think, good reason for doubting whether the genus is really undescribed, and there are some details in the paper in question, and in a subsequent one, containing descriptions of some mollusca from Aden, which require correction.

The genus *Francesia* was proposed by Dr. Paladilhe for a small species found by M. Issel close to Aden, and recognised by its describer as identical with a specimen from the banks of the Jumna sent to him by Prof. Mousson. This Indian shell was received by Mousson from Benson under the name of *Carychium scalare*. M. Paladilhe relates at length the enquiries which he undertook in order to ascertain if this *Carychium scalare* was described, and after consulting various authorities, amongst whom were Messrs. Gwyn Jeffreys and Hanley, he concluded that it was not; Mr.

Hanley assuring him that the name could not even be found in Benson's manuscripts.

It is quite true that no such species as *Carychium scalare* was ever described, but I cannot help feeling some surprise that none of the naturalists consulted should have noticed that a description of the shell was published by Benson in 1864 as the type of a new genus under the name of *Coilostele* (more correctly *Cælostele*) *scalaris*.* There cannot, I think, be any hesitation in identifying the species; the types were procured from the banks of the Jumna and Betwa, and the new genus *Coilostele* is, though with some little doubt, ascribed to the *Auriculacea* and compared with *Carychium*. The description agrees in all the external characters of the shell with that given by Dr. Paladilhe; in the latter, it is true, no mention is made of the absorption of the axis in the apical whorls, from which character the name *Cælostele* is derived, but this might be easily overlooked, and there cannot, I think, be much doubt as to the identity of the two genera *Cælostele* and *Francesia*, the former name having priority by 8 years.

There appears, however, to be a specific distinction between the Indian and Arabian forms which has escaped the notice of Dr. Paladilhe. The Indian *C. scalaris* is described by Mr. Benson as smooth (*testa lævi hyalina nitida*), whilst the Aden *Francesia scalaris* is said to be finely and very regularly marked with very elegant rather flexuous costulations. I have recently procured specimens of the Indian form from the neighbourhood of Karáchi in Sind, which agree with Mr. Benson's description and are entirely destitute of costulation.

As has already been mentioned, the genus *Cælostele* was referred by Benson, though not with great certainty, to the *Auriculidæ*, his principal reason being that he found the axis of the spire to be obsolete or absorbed as in *Auricula*, *Pythia*, and several other genera of *Auriculidæ*.† Paladilhe looked upon his *Francesia scalaris* as probably a fresh water mollusk, and he proposed to attach it provisionally to the family of the *Lymnæidæ*.‡ His principal reason, as he states, for believing it to be of aquatic origin, was that the numerous specimens examined by him had the whole shell and especially the aperture free from clay or mud, whereas he had noticed that small terrestrial mollusca, such as *Pupa*, *Vertigo*, &c. when left on the banks of torrents or rivers by floods (the position in which alone *C. scalaris* has

* Ann. and Mag. Nat. Hist. Ser. 3, XIII, p. 136. See also Zool. Record, 1864, p. 235 under *Auriculacea*.

† I find that the axis is equally wanting in the upper part of the spire in Sind specimens.

‡ He subsequently explained that in his opinion it was allied to the singular little genus *Moitesseria*, which is said to be aquatic, and on this account he had believed it allied to the freshwater pulmobranchs (Issel. Ann. Mus. Civ. Gen. IV, p. 525).

hitherto been found), have their surface more or less dirty and their orifice filled with detritus, the reverse being the case with fluviatile species.

Issel, who collected the *Aden* specimens, in a paper published* soon after that by Paladilhe, gives his reasons for disputing the systematic position assigned to *Francesia* by its author, and for considering it a terrestrial and not a fluviatile mollusk. In his opinion it belongs to the *Helicidæ*, and is allied to *Bulimus*. He points out certain characters which it has in common with *Stenogyra*, *Cæcilianella* and *Ennea*.† I think that there can be very little doubt as to the correctness of Issel's view so far as the terrestrial nature of the mollusk is concerned, and that his opinion of its affinities to the *Helicidæ* are more probable than Benson's supposition that the genus belongs to the *Auriculidæ*, or Paladilhe's that it should be assigned to the neighbourhood of the *Lymnæidæ*. I cannot see that the absorption of the spiral axis, the character upon which alone Benson appears to have relied, is sufficient evidence of affinity, because it is found in gastropodous genera belonging to widely different families, *e. g.*, in *Nerita*, and there is no other character in which the shell of *Cælostele scalaris* is shewn to have any close resemblance to *Auricula*; whilst the reason assigned by Paladilhe for supposing his genus *Francesia* fluviatile, the complete freedom of the shell, and especially of the orifice, from clay or sand is certainly an insufficient argument, at all events in those countries in which *Cælostele* has hitherto been found. I have just examined a small collection of minute shells, picked out from flood deposits in Sind, and amongst them I have found several specimens of *Planorbis* and *Bythinia* with their aperture filled with sand, whilst this appears to be very rarely indeed the case with the minute *Achatina balanus* of Benson, a species which Paladilhe assigns to *Francesia*, but evidently without having a clear idea of the species, for he, immediately afterwards, unless I am greatly mistaken, redescribes it as a new species under the name of *Cæcilianella Isseli*.

It is very singular that the animal of *A. balanus* should never have been observed and that we should be as much in doubt about its real affinities as we are about those of *Cælostele*. I am strongly disposed to believe that it is very closely allied to a shell described by Crosse from New Caledonia under the name of *Geostilbia Caledonica*.‡ The figure representing this form might almost be mistaken for that of *Achatina balanus*, but the geographical position of *Geostilbia Caledonica* is unfavorable to its identification with

* Ann. Mus. Civ. Gen. IV, p. 521.

† This genus does not belong to the *Helicidæ* but to a distinct family. Conf. Dohn, Malakoz. Blätt. XIII, p. 129; and Stoliczka J. A. S. B., 1871, XL, pt. 2, p. 159.

‡ M. Crosse very kindly gave me a specimen of this shell, but I have unfortunately left it in England and am unable to compare it with *Achatina balanus*.

the Indian species, which is found in the drier parts of India and apparently in other parts of South-western Asia where the fauna has Arabian and African affinities. The animal of *Geostilbia* has not been examined, but it is said to live underground. It is far from improbable that both *Cælostele scalaris* and *Achatina balanus* have a similar habitat, and this would account for their not having hitherto been observed living.

I think that there is some possibility too that these forms may be allied to *Ennea*, *Streptaxis*, and *Streptostele*. All have the very peculiar glassy structure characteristic of the *Streptaxidæ*. If this be the case, the animal will probably be brightly coloured, yellow or scarlet, or both. It is to be hoped that some Indian naturalist may succeed in obtaining these species alive and determining their affinities.

If the opinions above expressed be correct, the synonymy of the two forms of *Cælostele* will be the following :

1. CÆLOSTELE SCALARIS.

Coilostele scalaris, Benson, Ann. & Mag. Nat. Hist., 1864, Ser. 3, XIII, p. 136.

Hab.—Western and North-western India.

2. CÆLOSTELE sp.

Francesia scalaris, Paladilhe, Ann. Mus. Civ. St. Nat. Gen., 1872, III, p. 10, Pl. I, fig. 1-4.—Issel, ib, IV, p. 521, 530.

Hab.—Aden in Arabia and Sek Said Island, Dahalac Archipelago, Red Sea.

I do not propose a new name for the second species, although I think it requires one, because I have a great dislike to giving names to species which I have not seen, because there is still a possibility that the genus *Francesia* may not be identical with *Cælostele*, as the peculiar character of the latter, the absorption of the axis in the upper whorls, has not been observed in the former, and thirdly because I consider the practice so prevalent amongst some naturalists of giving new names to everything they are unable to identify extremely objectionable and liable to cause confusion. I trust, however, that either M. Issel or M. Paladilhe will re-examine the Aden shell, and, if, as I anticipate, it proves to belong to the genus *Cælostele*, re-name it.

Besides *Francesia scalaris*, the following species are described from Aden by M. Paladilhe :

- | | |
|--|------------------------------------|
| 1. <i>Bulinus Yemenensis</i> . | 6. <i>Limicolaria Bourignati</i> . |
| 2. <i>B. Samavaensis</i> , Mousson MS. | 7. <i>Ennea Isseli</i> . |
| 3. <i>B. vermiformis</i> . | 8. <i>Pupa Antinorii</i> . |
| 4. <i>B. cerealis</i> . | 9. <i>Cæcilianella Isseli</i> . |
| 5. <i>B. lucidissimus</i> . | 10. <i>Physa Beccarii</i> . |

Of these, *Cæcilianella Isseli** I believe, as I have already stated, to be identical with *Achatina balanus* of Benson. *Bulimus Samavaensis*, *B. cerealis* and *B. vermiformis* appear all to be varieties of the widely spread and variable *Pupa cœnopicta*, Hutton. This has already been indicated in the case of *B. cerealis* and *B. vermiformis* by Morelet (Ann. Mus. Civ. III, p. 201.) and Issel states that *B. Samavaensis* has also been identified with *B. cœnopictus* by the same naturalist.† It is quite true that the shells named by M. Paladilhe present well marked differences, and that the circumstance of all being found in one place is opposed to the idea of their being races of one species. At the same time it does not follow that all these forms inhabit the same spot because their shells are carried down by the same torrent and mingled in the flood deposits, and I have similarly found two or three varieties together in various parts of India. I have examined a large number of specimens from the drier parts of India, from Upper Burma, Persia, and Abyssinia, and although there are several well marked forms deserving distinctive names, I am inclined to believe that all pass into each other. At the same time I am not prepared to admit with M. Jickeli, as quoted by Issel, (Ann. Mus. Civ. IV, p. 528, note), that these tropical shells are identical with the North American *Pupa fallax* of Say. I have not access to Jickeli's original paper, and cannot say on what his opinion is founded. *Pupa fallax* is found in various parts of the United States, and the peristome is edentulous, and entirely destitute of the parietal tooth which is found more or less developed close to the posterior angle of the aperture in all forms of *B. cœnopictus*. Even should some shells of *B. cœnopictus* be undistinguishable from some of *P. fallax* it would, I think be well to compare the animals before uniting the two.

Issel has pointed out‡ that *Limicolaria Bourignati* belongs rather to *Stenogyra* than to the genus to which M. Paladilhe assigned it. I am unable to distinguish it from a very common variety of *Stenogyra* (*Opeas gracilis* (*Bulimus gracilis*, Hutton). M. Paladilhe considers it a peculiarly African form, but *Stenogyra gracilis* is found not only in India proper but in the Malay region.

It is remarkable that amongst the shells found near Aden, no form of *Bulimus insularis* (*B. pullus*, Gray) should have been comprised. One has

* My attention was called to this and some of the other identifications given below by my friend Mr. G. Nevill.

† Ann. Mus. Civ. IV, p. 527. I cannot however find the species mentioned by Morelet; can M. Issel has mistaken *Sennaarensis* which Morelet does identify with *P. cœnopicta* for *Samavaensis*?

‡ Ann. Mus. Civ. IV, p. 523, note.

been described by Pfeiffer under the name of *B. Adenensis*. The species is at least as variable and nearly as widely spread as *B. cœnopictus*.*

P. S.—Whilst the preceding paper was passing through the press, I received a letter from Colonel R. H. Beddome, in which he told me that he had compared, under the microscope, a specimen of *Geostilbia Caledonica* with a shell which he found in north Canara, and that they were identical. Now the north Canara shell was in all probability *Achatina balanus*, and if this be the case, it follows that the identity of that form with *G. caledonica* which I have long suspected, and to which I have referred at p. 43, is not merely generic, but specific.

* In an excellent account of the land and freshwater shells of Borneo by Issel, also published in the *Annali del Museo Civico*, Vol. VI, p. 366, I am credited with the authorship of the genus *Optediceros*. This is a mistake. I never invented the genus, but I shewed (*Ann. and Mag. Nat. Hist. Ser. 3, XIX, p. 381*) that *Optediceros* of Leith, described in the *Journal of the Bombay Branch of the Royal Asiatic Society*, Vol. V, p. 145, is identical with *Assimineæ*. I think, too, it is to be regretted that a shell like *Assimineæ cornea*, Pfeiffer *nee* Leith, should still be referred to *Hydrocena*, and *Assimineæ carinata*, Lea to *Omphalotropis*. Martens long since pointed out (*Malakoz. Blätt. 1864, p. 142,*) that the type of *Hydrocena* belongs to a very different family, (*Georissa* is very close to it if not identical,) whilst I have shewn (*Ann. and Mag. N. H. 4, III, p. 340*) that *Omphalotropis* belongs to the *Cyclostomidæ*. *Assimineæ* on the other hand is a Rissoid.
